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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/542,897	07/20/2005	Raoul Florent	FR 030002	1776

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EXAMINER	
BLOOM, NATHAN J	

ART UNIT	PAPER NUMBER
2624	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/542,897	FLORENT ET AL.	
	Examiner	Art Unit	
	Nathan Bloom	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 July 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

Claims 1-7, 11, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yang et. al. ("Structure Adaptive Anisotropic Image Filtering").

Instant claim 1: Image processing system for generating a multidimensional adaptive oriented filter to be applied to the point intensities of an image formed in a number d of dimensions, comprising:

processing means for producing, from the image point intensities [I(x)], adaptive oriented filter coefficients [w(r)] formed through combination (.II.) of weighted scalar coefficients [$w_1(r) \ldots w_i(r) \ldots w_d(r)$], which coefficients are weighted scalar products [$w_i = f_i(\langle e_i . r \rangle)$] of a number d of vectors ($e_1 \ldots e_i \ldots e_d$) of an oriented vectors basis, by a number n of local vectors (r) estimated over a neighborhood [N(x)] around the current image point. [*See paragraph 1 of section 2 wherein: image intensities represented by f(x), the weights (W(r)) are defined as* $k(x_0,x)$, $k(x_0,x)$ *is a function of* ρ *and an exponential wherein* e_i *(defined as n by Yang) and r (defined as* x_i *by Yang) are used to form scalar products, where*in ***x*** *and the neighborhood are defined and the current image point is defined as* x_0. *Only the method is described in this paper, but examiner takes official notice that one of ordinary skill in the art would have known how to implement such a filtering procedure in a computer system. Furthermore, as can be seen in the application and conclusions section of this document the method has been implemented and tested to provide performance results.*]

Instant claim 2: Image processing system of claim 1, comprising:

product means for producing the weighted scalar coefficients [$W_1(r), \ldots, W_i(r), \ldots W_d(r)$]; combination means (.II.) for combining the weighted scalar coefficients to produce a set of one-scalar weight coefficients [W(r)] forming the adaptive oriented filter kernels; and filtering means (g) for producing filtered image data [g(x)] from the combination of the image data [I(x+r)] over the neighborhood [N(x)] with the one-scalar weight coefficients [W(r)]. [*As per rejection of instant claim 1 the creation and combination of the weights was taught. See equations 1 and 2 wherein the filtering of an image using the coefficients is taught. The means to carry out the filtering process was known as per rejection of claim 1.*]

Instant claim 3: The system of one of claim 1, comprising:

a direction estimator (10) for providing, at each image point, an oriented orthogonal basis of a number d of vectors (e_1- e_d); [*See d=2 for example shown in section 2, d > 2 is taught in section 6. The orientation of the orthogonal basis is determined as per the method described in section 3.*]

a site generator (20) for providing n site vectors forming a neighborhood [N(x)] of the image points; and [*The generation of the neighboring vectors is stated as (x-x0) in equation 3 wherein each vector x is defined with respected to x0 (origin) and thus generating the n site vectors. Also, see section 2 of Yang.*]

product means for computing a number d of scalar products [$<e_i\ r>$] of the vectors of the orthogonal vector basis for each of the n site vectors (r), for each image point. [*See equation 4 wherein the orthogonal vector basis n is used with (x-x0) to produce the scalar product <n, x-x0>.*]

Instant claim 4: The system of one of claim 1, comprising: weighting means for weighting the scalar products [$<e_i . r>$] through scalar functions (f_i). [*See rejection of claim 1 wherein equations 3 and 4 produce scalar values with respect to the scalar product of n and* ***x****.*]

Instant claim 5: The system of claim 1, comprising: filtering means including a weighted normalized sum of the products of image data [I(x+r)] over the neighborhood [N(x)] of the image points by the one-scalar weight coefficients [W(r)] forming the adaptive oriented filter kernels. [*See equations 1 and 2 wherein equation 2 shows the normalization factor produced by summation of the weight coefficients.*]

Instant claim 6: The system of claim 1, wherein: the combination means (.II.), for producing the set of one-scalar weight coefficients [W(r)] forming the adaptive oriented filter kernels, is a d-terms product. [*$k(x_0,x)$ will have m (number of dimensions) terms for each chosen position x_0.*]

Instant claim 7: The system of claim 1, wherein: the direction estimator (10) for producing the vectors of the oriented vector basis includes direction estimation means for estimating direction of image features based on gradient estimation or eigen vectors of Hessien or of tensors of structure. [*See paragraph 2 of section wherein the direction is a function of local gradient strength. Section 3 goes into further details of the gradient calculations and direction estimation.*]

Instant claim 11: Image processing method for generating a multidimensional adaptive oriented filter to process image data in a number d of dimensions, using a system as Claimed in claim 1, comprising steps of: computing, from the image point intensities [I(x)], adaptive oriented filter kernels [w(r)] formed through the combination (.II.) of weighted scalar coefficients [$W_1(r)$ . . . $W_i(r)$ . . . $W_d(r)$], which coefficients are weighted scalar products [$W_i = f_i(<e_i. r>)$] of a number d of vectors of an oriented vectors basis (e_1 . . . e_i . . . e_d), by a number n of local vectors (r) estimated over a neighborhood [N(x)] around the current image point; filtering (g) the image data [I(x+r)] by the adaptive oriented filter kernels [w(r)] for producing filtered image data [g(x)] over the neighborhood [N(x)]. [As per rejection of instant claim 1 the process has been disclosed.]

Instant claim 13: A computer program product comprising a set of instructions for carrying out the method as claimed in claim 11. [*As per rejection of instant claim 1 the implementation of this system was known. Furthermore, the implementation of the filtering method on a computer system would've included software and thus this limitation has been taught as per rejection of instant claim 1.*]

1. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yang as applied to claim 1 above, and further in view of Gonzalez ("Digital Image Processing" 2nd Edition).

Instant claim 8: The system of claim 1, comprising: weighting means for producing the weighting functions chosen among Gaussian functions and/or symmetrical functions whose output is positive for values near zero inside a canal and is negative each side of the canal

beyond the canal. [*In paragraphs 2-3 of Yang the use of a Gaussian Kernel is taught for smoothing the image depending on local direction and edges/corners, but this kernel does not have the canal properties described in the claim limitations above. This filter is referred to as a Laplacian of Gaussian or a Mexican Hat function and is used instead of just a Gaussian filter because it not only smoothes out the noise (Gaussian) but it also strengthens the location of the edges (Laplacian). It would have been obvious to one of ordinary skill in the art to substitute a Mexican Hat filter for the Gaussian taught by Yang to provide established edge locations, and thus further enhance the image characteristics as is intended by Yang. The LoG or Mexican Hat filter is shown in section 10.1 pages 582-583 of Gonzalez.*]

2. Claims 9 and 12 rejected under 35 U.S.C. 103(a) as being unpatentable over Yang as applied to claim 1 above, and further in view of Moghaddam (US 6584221).

Instant claim 9: The system of claim 1, comprising control means for the user to select image oriented features to be processed through the direction estimator (10) and/or the type of neighborhood [N(x)] for the Site Generator (20). [Yang does not teach the use of UI for selection of filter parameters or ROI (neighborhoods) via a user interface (control means). However methods of filtering user selected objects and regions (neighborhoods) were known to one of ordinary skill in the art as is shown by the teachings of Moghaddam. Moghaddam teaches the display and selection of regions in figures 3-4 and 6-7. Further detail and description of this is described in columns 2-5. It would have been obvious to one of ordinary skill in the art to allow the user to select the regions to be filtered in Yang so that only the regions of interest to the

user are enhanced for further viewing and analysis. This ROI selection allows for less processing as only the regions of importance to the user are processed.]

Instant claim 12: Medical examination apparatus comprising means to acquire d-dimensional image data [I(x)], a system as Claimed in claim 1 and further comprising a display system (154) for visualizing processed images and user control means (158) for selecting weighting functions and/or acting on the direction estimator and/or the site generator. [See rejection of claim 9 wherein a GUI is used as the control means. See figure 7 of Moghaddam.]

3. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yang as applied to claim 1 above, and further in view of August (US 2003/0156762).

Instant claim 10: The system of claim 1, comprising control means for the user to choose the shape of the weighting functions (f_i), for selecting the amount of filtering, which corresponds to positive coefficients, and for selecting the amount of enhancement, which corresponds to negative coefficients. [*Yang teaches the generation of the filter shape, weights, and then the filtering of the image, but does not teach the use of a user interface to control or change the filter parameters. However, August teaches in paragraph 0535 the use of a user interface to vary the filter parameters and thus allow the user to vary the filter parameters based on user analysis. It would have been obvious to one of ordinary skill in the art to combine Yang with August to allow user control of the filter parameters and thus increase the performance/efficiency of the filtering process due to the "tweaked" filter parameters.*]

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nathan Bloom whose telephone number is 571-272-9321. The examiner can normally be reached on Monday through Friday from 8:30 am to 5:00 pm (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Samir Ahmed, can be reached on 571-272-7413. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Nathan Bloom